

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	S-1
1 NEED FOR RESUMPTION OF L-REACTOR OPERATIONS AND PURPOSE OF THIS ENVIRONMENTAL ASSESSMENT.....	1-1
1.1 Need.....	1-1
1.2 Purpose.....	1-2
1.2.1 Proposed action and alternative.....	1-2
1.2.2 Items considered in this assessment.....	1-2
REFERENCES FOR CHAPTER 1.....	1-3
2 PROPOSED ACTION AND ALTERNATIVE.....	2-1
2.1 Production process.....	2-1
2.2 L-Reacto and support systems.....	2-3
2.2.1 Reactor system.....	2-3
2.2.1.1 System description.....	2-3
2.2.1.2 Reactor shutdown systems.....	2-5
2.2.1.3 Engineered safety systems.....	2-6
2.2.2 Primary coolant system.....	2-7
2.2.3 Secondary coolant system.....	2-7
2.2.4 Core reloading.....	2-8
2.2.5 Fuel storage.....	2-8
2.2.6 Electric power.....	2-8
2.2.7 Gas systems.....	2-9
2.2.7.1 Blanket gas system.....	2-9
2.2.7.2 Activity confinement system.....	2-9
2.2.8 Liquid radwaste system.....	2-11
2.2.9 Solid radwaste.....	2-12
2.2.10 Process and effluent monitoring.....	2-12
2.2.11 Other support systems.....	2-13
2.2.11.1 Steam.....	2-13
2.2.11.2 Potable water.....	2-13
2.2.11.3 Sanitary sewage.....	2-13
2.2.12 Safeguards and security.....	2-13
REFERENCES FOR CHAPTER 2.....	2-14
3 AFFECTED ENVIRONMENT.....	3-1
3.1 Site location, site description and land use, and historic and archeological resources.....	3-1
3.1.1 Site location.....	3-1
3.1.2 Site description and land use.....	3-1
3.1.3 Historic and archeological resources.....	3-4
3.2 Socioeconomic and community characteristics.....	3-6
3.3 Geology and seismology.....	3-8
3.4 Hydrology.....	3-9

TABLE OF CONTENTS (continued)

	<u>Page</u>
3.4.1 Surface water.....	3-9
3.4.1.1 Savannah River.....	3-9
3.4.1.2 SRP streams and swamp.....	3-10
3.4.1.3 Surface water use.....	3-15
3.4.2 Subsurface hydrology.....	3-15
3.4.2.1 Occurrence of ground water.....	3-15
3.4.2.2 Ground-water movement.....	3-16
3.4.2.3 Ground-water quality.....	3-19
3.4.2.4 Ground-water use.....	3-19
3.5 Meteorology and climatology.....	3-21
3.5.1 Climatology.....	3-21
3.5.2 Wind speed and direction.....	3-21
3.5.3 Precipitation.....	3-21
3.5.4 Severe weather.....	3-25
3.5.4.1 Extreme winds.....	3-25
3.5.4.2 Tornadoes.....	3-25
3.5.5 Atmospheric dispersion.....	3-25
3.5.5.1 Atmospheric stability.....	3-25
3.5.5.2 Mixing height and low-level inversions...	3-26
3.5.6 Air quality.....	3-27
3.6 Ecology.....	3-27
3.6.1 Vegetation.....	3-27
3.6.1.1 Steel Creek corridor.....	3-29
3.6.1.2 Steel Creek delta.....	3-32
3.6.2 Wildlife.....	3-35
3.6.3 Aquatic flora.....	3-38
3.6.4 Aquatic invertebrates.....	3-38
3.6.5 Fish.....	3-39
3.6.6 Endangered and threatened species.....	3-40
3.6.7 Commercially and recreationally valuable biota....	3-41
3.7 Radiation environment.....	3-42
3.7.1 L-Reactor area.....	3-42
3.7.2 Cesium-137 inventory in the Steel Creek-	
Savannah River system.....	3-42
3.7.2.1 Cesium in sediments.....	3-43
3.7.2.2 Radiocesium inventory.....	3-45
3.7.2.3 Cesium-137 in biota.....	3-45
REFERENCES FOR CHAPTER 3.....	3-48
4 ENVIRONMENTAL CONSEQUENCES.....	4-1
4.1 L-Reactor operation.....	4-1
4.1.1 Nonradiological impacts.....	4-1
4.1.1.1 Land use and socioeconomics.....	4-1
4.1.1.2 Surface-water usage.....	4-4
4.1.1.3 Liquid effluents.....	4-6
4.1.1.4 Atmospheric releases.....	4-14
4.1.1.5 Solid wastes.....	4-17
4.1.2 Radiological impacts--L-Reactor.....	4-17

TABLE OF CONTENTS (continued)

	<u>Page</u>
4.1.2.1 Dose commitments from releases from reactor operation.....	4-17
4.1.2.2 Occupational dose.....	4-24
4.1.2.3 Accidents.....	4-26
4.2 Incremental SRP impacts from L-Reactor operation.....	4-31
4.2.1 Nonradiological impacts.....	4-32
4.2.1.1 Socioeconomics.....	4-32
4.2.1.2 Liquid releases.....	4-32
4.2.1.3 Atmospheric releases.....	4-34
4.2.1.4 Transportation effects.....	4-37
4.2.2 Radiological effects.....	4-37
4.2.2.1 Dose commitments from radioactive releases from support facilities due to L-Reactor operation.....	4-37
4.2.2.2 Waste management operations.....	4-39
4.2.2.3 Occupational dose.....	4-42
4.2.2.4 Transportation of radioactive materials..	4-42
4.3 Dose commitments from L-Reactor and its support facilities.....	4-42
4.4 Cumulative impacts.....	4-43
4.4.1 Socioeconomics.....	4-44
4.4.2 Surface-water usage.....	4-46
4.4.3 Thermal discharge.....	4-47
4.4.3.1 Wetlands.....	4-47
4.4.3.2 Thermal discharge to the Savannah River..	4-47
4.4.4 Radiological effects.....	4-48
4.5 Studies and monitoring.....	4-49
4.5.1 SRP monitoring programs.....	4-49
4.5.1.1 Radiological monitoring programs.....	4-49
4.5.1.2 SRP nonradiological monitoring programs..	4-50
4.5.2 L-Reactor monitoring programs.....	4-50
4.5.2.1 Effluent monitoring.....	4-50
4.5.2.2 Ground water.....	4-51
4.5.2.3 Radiocesium.....	4-51
4.5.2.4 Ecology.....	4-51
4.5.2.5 Archeology.....	4-52
4.6 No-action alternative.....	4-52
REFERENCES FOR CHAPTER 4.....	4-53
 5 SUMMARY OF PROJECTED L-REACTOR RELEASES AND IMPACTS.....	5-1
5.1 Summary of pre-1968 and post-1984 releases.....	5-1
5.1.1 Nonradiological releases.....	5-1
5.1.1.1 Thermal discharge.....	5-1
5.1.1.2 Chemical releases.....	5-2
5.1.1.3 Atmospheric releases.....	5-3
5.1.1.4 Solid waste.....	5-3
5.1.2 Radiological releases.....	5-3
5.1.2.1 Atmospheric releases.....	5-3
5.1.2.2 Liquid releases.....	5-4
5.1.2.3 Radiocesium transport in Steel Creek....	5-5

TABLE OF CONTENTS (continued)

	<u>Page</u>
5.2 Summary of pre-1968 and post-1984 impacts.....	5-6
5.2.1 Thermal discharge.....	5-6
5.2.2 Cooling-water withdrawal.....	5-6
5.2.3 Chemical releases.....	5-12
5.2.4 Radiological impacts.....	5-12
REFERENCES FOR CHAPTER 5.....	5-14
 6 FEDERAL AND STATE PERMITS AND APPROVAL.....	6-1
6.1 Historic preservation.....	6-1
6.2 Solid waste disposal.....	6-1
6.3 Endangered species.....	6-3
6.4 Water quality.....	6-4
6.5 Wetlands	6-5
6.6 Air quality.....	6-5
Appendix A. RADIATION DOSE CALCULATION METHODS AND ASSUMPTIONS....	A-1
Appendix B. FLOODPLAIN/WETLANDS ASSESSMENT - L-REACTOR OPERATIONS..	B-1
Appendix C. CONVERSION TABLE.....	C-1

LIST OF TABLES

<u>Table</u>		<u>Page</u>
S-1	Summary of projected impacts from L-Reactor operation.....	S-4
2-1	Typical L-Reactor operating parameters.....	2-5
3-1	1980 populations for counties and communities.....	3-8
3-2	Number of days in 23-year period (June 1, 1955 to September 30, 1978) when maximum temperature of Savannah River near Ellenton Landing, South Carolina, equaled or exceeded upper water-temperature limits.....	3-10
3-3	Reactor discharges to Steel Creek.....	3-14
3-4	Steel Creek stream characteristics.....	3-14
3-5	Typical Steel Creek temperatures.....	3-14
3-6	Monthly and annual average wind speeds from WJBF-TV tower, 1976-1977.....	3-24
3-7	Precipitation at Savannah River Plant, 1952-1978.....	3-24
3-8	Extreme wind speeds for SRP area.....	3-25
3-9	Monthly and annual atmospheric stability class distributions based on ΔT (91-10 meters) for 1976-1977.....	3-26
3-10	1979 South Carolina and 1980 Georgia ambient air quality standards and measures.....	3-28
3-11	Range of cesium-137 concentrations of soil types in Steel Creek (1981).....	3-43
3-12	Mean radiocesium concentrations in soil column by soil particle size.....	3-44
4-1	Summary of potential environmental impacts due to resumption of L-Reactor operations.....	4-2
4-2	Demographic characteristics of relocating L-Reactor operational workers.....	4-5
4-3	Sources of chemical discharges to Steel Creek from L-Reactor area.....	4-14
4-4	Comparison of liquid effluent water quality with appli- cable water quality criteria and drinking-water standards and with water quality of Savannah River and Steel Creek.....	4-15
4-5	Expected annual atmospheric releases from L-Reactor operation.....	4-18
4-6	Expected average annual liquid radioactive releases from L-Reactor.....	4-20
4-7	Predicted radiocesium remobilization compared with current transport values.....	4-23
4-8	Summary of maximum total-body dose commitments from the operation of L-Reactor.....	4-25
4-9	Total doses to workers in P-, K-, and C-Reactor areas.....	4-25
4-10	Calculated radiation dose to a person at the SRP site boundary during the 2-hour exposure period following accident.....	4-28
4-11	Risk evaluation of accidents.....	4-29

LIST OF TABLES (continued)

<u>Table</u>		<u>Page</u>
4-12	Estimated nonradioactive incremental releases to the separations areas and the fuel/target fabrication area seepage basins.....	4-33
4-13	Expected effluent concentrations from chemical separations areas (F and H) and fuel/target fabrication area (M) to surface streams.....	4-35
4-14	Incremental air pollutant releases resulting from L-Reactor operation.....	4-36
4-15	A comparison of impact on ambient air quality from increases at K-Area plant and from SRP total.....	4-36
4-16	Estimated incremental annual average releases of radionuclides to the atmosphere from operation of L-Reactor support facilities.....	4-38
4-17	Estimated incremental releases of radionuclides to surface streams due to operation of L-Reactor support facilities.	4-39
4-18	Incremental radionuclide releases to seepage basins from support facilities.....	4-40
4-19	Estimated incremental releases of radionuclides to streams from seepage basins due to operation of support facilities.....	4-41
4-20	Summary of maximum individual and regional population total-body doses from the operation of L-Reactor and SRP support facilities.....	4-43
4-21	Cumulative SRP land use and socioeconomic impact on six-county area.....	4-45
4-22	Cumulative SRP economic impact analyses, end of third quarter 1986.....	4-46
5-1	Reactor discharges to Steel Creek.....	5-1
5-2	Maximum temperature increase of Savannah River caused by operations of the Savannah River Plant reactors.....	5-2
5-3	L-Reactor atmospheric releases.....	5-4
5-4	L-Reactor liquid releases to surface streams and seepage basins.....	5-5
5-5	Summary of projected impacts from L-Reactor operations....	5-7
5-6	Comparisons of water quality parameters above and below SRP in the Savannah River before and after L-Reactor was placed on standby status.....	5-12
6-1	Required regulatory permits and notifications.....	6-2

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
2-1	Reactor process systems.....	2-2
2-2	Major L-Reactor area site structures.....	2-4
2-3	Reactor ventilation system.....	2-10
3-1	SRP location in relation to surrounding population centers.....	3-2
3-2	Savannah River Plant site.....	3-3
3-3	General map of archeological survey area.....	3-5
3-4	Six-county area.....	3-7
3-5	Savannah River flow (water years 1970-1979).....	3-11
3-6	Monthly average daily maximum temperatures for 1960-1970...	3-12
3-7	Hydrostatic head of ground water in wells near H-Area in relation to principal hydro-geologic units.....	3-17
3-8	Depth (feet) to water table.....	3-18
3-9	Typical ion-exchange capacities of SRP unconsolidated sands and clays.....	3-20
3-10	WJBF-TV tower data--10-meter level seasonal wind roses for 1976-1977.....	3-22
3-11	WJBF-TV tower data--10-meter level annual wind roses for 1976-1977.....	3-23
3-12	Steel Creek corridor vegetation map and sample locations...	3-30
3-13	Vegetative zones of Steel Creek delta resulting from L-Reactor operation (1952-1968) and associated hydrologic regimes.....	3-33
3-14	Vegetation map of Steel Creek delta based on 1978 aerial photographs and 1981 field studies.....	3-34
3-15	Distribution of signs, tracks, and nests of American alligator along Steel Creek, 1981.....	3-37
3-16	Radiocesium inventory in 1981.....	3-46
4-1	Calculated temperature profiles for Steel Creek.....	4-8
4-2	Temperature difference across mixing-zone boundary with distance down Savannah River from mouth of Steel Creek (K- and L-Reactors).....	4-12